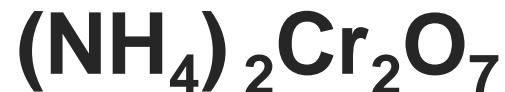


# ***Bell Work***

## ***19/20-Jan-16***

**Name all of these and give the formula weights (masses)**



# *Objective:*

You will KNOW what a mole is

You will be able to convert from grams to moles

- Know how to calculate molar mass
- Convert between grams and mole

# ***MOLE***

The mole is a unit of measurement, like  
a ton or a dozen

Ton = 2000 of something

Dozen = 12 of something

1 Mole =  $6.02 \times 10^{23}$  of something



<http://youtu.be/TEl4jeETVmg>

# *The Mole and Molar Mass*

**Q: Why don't we simply stick with units like grams, nanograms (ng), kilograms (kg), etc.?**

**A: Moles give us a consistent method to convert between atoms/molecules and grams**



# ***MOLAR MASS***

The mass of 1 mole of a compound is called *molar mass*

**Molecular Mass (amu) = Molar Mass (grams/ mole)**

Molecular Mass of  $\text{H}_2\text{O}$  = 18 a.m.u.

Molar Mass of  $\text{H}_2\text{O}$  = 18 g/mol

# ***MOLAR MASS***

**Molecular Mass (amu) = Molar  
Mass (grams/ mole)**

**Molecular Mass of  $\text{CO}_2$  = 44 a.m.u.**

**Molar Mass of  $\text{CO}_2$  = ? g/mol 44g/mol**

**What are the molar masses of -  
 $\text{NaCl}$ ,  $\text{O}_2$ , and  $\text{Pb}(\text{NO}_3)_2$  ?**

# *Molar Mass*

Molar Mass: The weight in grams of 1 mole of an element.

What the molar mass of oxygen: 15.99g/mol

What about: Cl?

Formula Mass: The weight in grams of 1 mole of a compound.

What is the Formula mass of H<sub>2</sub>O: 18g/mol

What about CO<sub>2</sub> and HC<sub>2</sub>H<sub>3</sub>O<sub>2</sub>

# ***MOLES TO GRAMS***

Multiply number of moles by molar mass

#mol of Y x molar mass = grams of Y

$$2 \text{ moles H}_2\text{O} \times \frac{18\text{g H}_2\text{O}}{\text{mole H}_2\text{O}} = 36\text{g H}_2\text{O}$$



# ***PRACTICE***

**How many grams of the following?**

**2 moles HCl  $\rightarrow$  ? grams HCl (find M.M. HCl first)**

**3.5 moles KNO<sub>3</sub>  $\rightarrow$  ? grams KNO<sub>3</sub>**

**2.4 moles lead (II) hydroxide  $\rightarrow$  ? grams**

# ***Practice***

What is the mass of 1 mole (molar mass) of:

- |                           |                             |                    |
|---------------------------|-----------------------------|--------------------|
| 1. $\text{H}_2$           | 2. $\text{Mg}(\text{OH})_2$ | 3. $\text{CO}_2$   |
| 4. $\text{NH}_4\text{Cl}$ | 5. $\text{CuSO}_4$          | 6. $\text{AgNO}_3$ |

Convert from grams to moles, or moles to grams

7. How many moles is 12.5 g of magnesium hydroxide?
8. How many moles is 1.46 g of hydrogen gas ( $\text{H}_2$ )?
9. How many grams are in 4.3 moles of ammonium chloride?

# ***Reaction Type Prediction***



Lead (II) chloride reacts with lithium sulfate to produce lead (II) sulfate and \_\_\_\_\_

Carbon tetrahydride reacts with oxygen to produce...?

Nitrogen trihydride reacts with hydrochloric acid to produce ammonium chloride

# *In Class*

Page 196 problem #28

Read 198-203 problems #33-37

Due 21-Jan-16

# *Bell Work*

## *27-Jan-2017*

What is the formula mass (g/mol) of glucose



If there are 10g of glucose how many moles would there be?

EQ: What responsibilities do I have as an American to my country, community, family and self?

## *Objective:*

You will easily be able to convert between moles, atoms, and grams of a single substance.

- You will know when to use Avogadro's number

# *Avogadro's Number*

A set number of atoms with a mass in grams (g) equal to the mass of one atom in atomic mass units (amu).

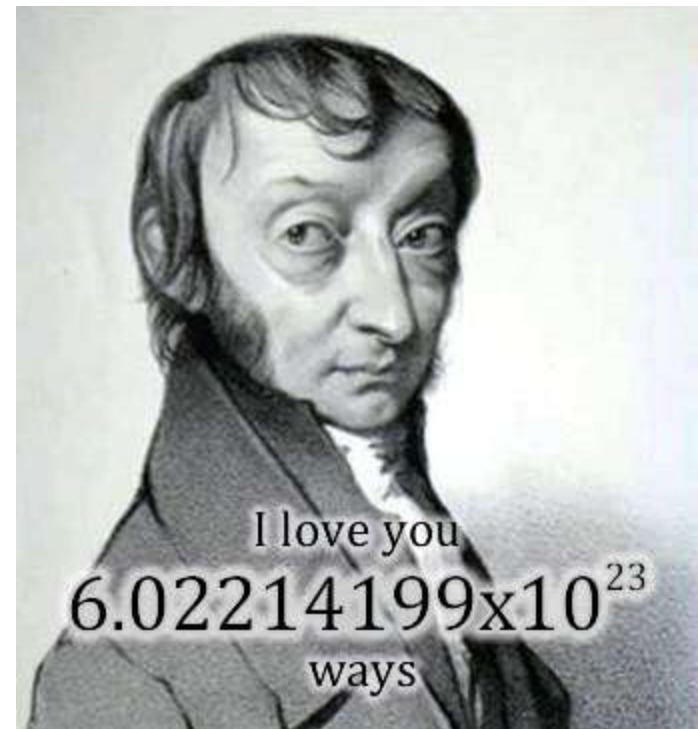
Avogadro's number =

**$6.02 \times 10^{23}$  atoms/ molecules/ particles**

# *WHAT'S A MOLE*

A mole is the quantity of anything that has the same number of particles found in 12.000 grams of carbon-12

**That number of  
particles is  
Avogadro's  
Number:  
 $6.02 \times 10^{23}$**





# ***MOLE***

If I have a mole of Mr. Golden's then I have a  $6.02 \times 10^{23}$  Mr. Golden's.

If I have a mole of pens then I have  $6.02 \times 10^{23}$  pens

Conversion factor:

$6.02 \times 10^{23}$  some things (atoms, etc)

**mole**

# *PRACTICE*

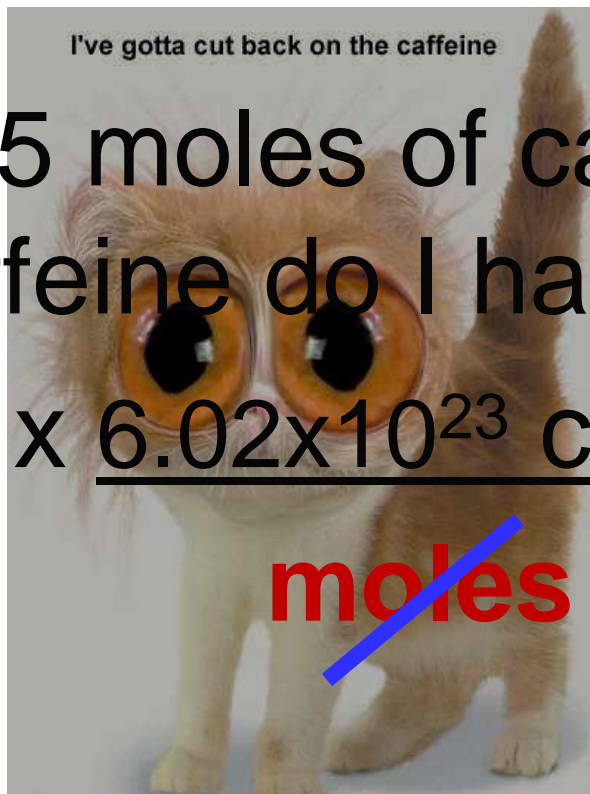
If Mr. 2 Chainz has 2 moles of chainz  
then he has:

$$2 \text{ moles} \times \frac{6.02 \times 10^{23} \text{ chainz}}{\text{moles}} = ?$$

**$1.2 \times 10^{24}$  chainz**



# *PRACTICE*



If I have 4.5 moles of caffeine how much caffeine do I have?

$$4.5 \text{ ~~moles~~ } \times \frac{6.02 \times 10^{23} \text{ caffeine}}{\text{moles}} = ?$$

$$2.71 \times 10^{24} \text{ caffeine}$$

# *ATOMS TO MOLES*

**Atoms/ molecules → moles**

# of **atoms** X      moles      = # of moles

6.02x10<sup>23</sup> **atoms**

**Moles → Atoms/ molecules**

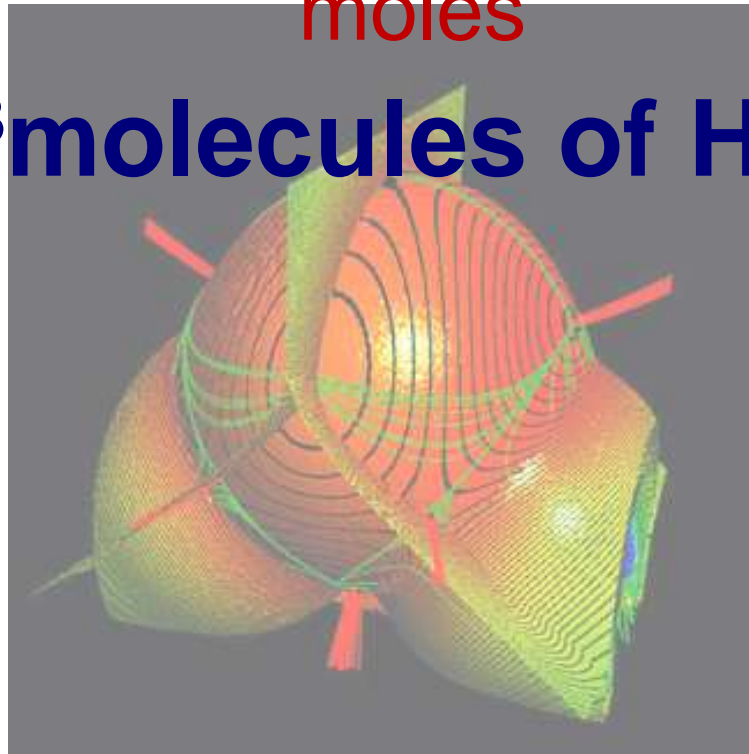
# of **moles** X 6.02x10<sup>23</sup> atoms = # of atoms  
**moles**

# *PRACTICE*

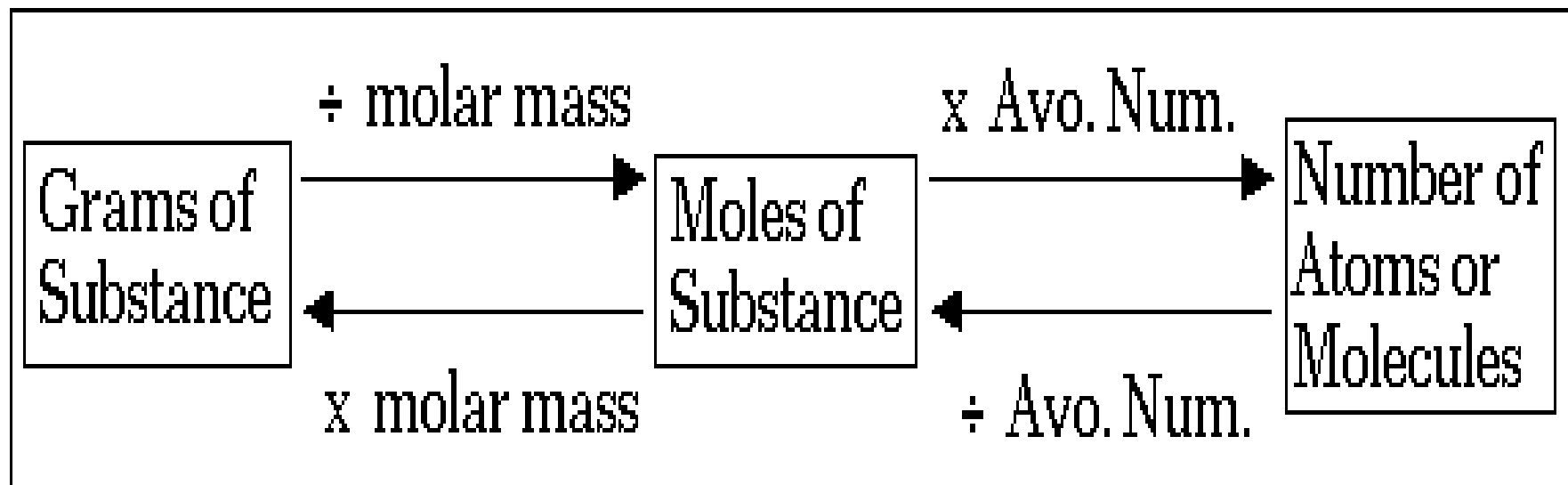
If I have 1.5 moles of  $\text{H}_2\text{O}$  then I have:

$$1.5 \text{ moles} \times \underline{6.023 \times 10^{23} \text{ molecules of } \text{H}_2\text{O}} = ?$$

$$9.03 \times 10^{23} \text{ molecules of } \text{H}_2\text{O}$$



*Grams*  $\leftarrow \rightarrow$  *Moles*  $\leftarrow \rightarrow$  *Atoms*



# *Molecules, Atom, Grams, and Mole Calculation Practice*

In your lab groups you will work out **Every** example stepwise as a team

-each person need to have all of the examples and practice problems w/ all work for credit shown

As a team Write out assigned problems and correct set up to solve on poster paper

# *Home Work Finish In Class*

## *work form 24Jan17*

Page 196 problem #28

Read 198-203 problems #33-37

Due 30-Jan-17



# *Bell Work*

## *30-Jan-2017*

A modern cars combustion engine produces energy through the combustion of gasoline and/ or ethanol plus various other additives, for purposes of ease assume the reaction between gasoline and oxygen produces 105.0g of carbon dioxide every 30s while driving at highway speed.

Using this data, how many molecule of carbon dioxide are produced every 30s?  
Every hour?

# *Agenda*

## **Mole Bean lab**

### *Objective:*

You will **KNOW** how the value of a mole was calculated and what a mole is!!!

EQ: After a win on a sports field or an academic assignment what is your next responsibility in order to repeat on the next challenge?

# ***Mole Bean Lab***

Follow all directions.

The formulas you need are on the bottom of the first page

Return all of the beans to the correct beaker at the stock table when you are finished.

# *Bell Work*

## *31-Jan-2017*

- i. What is the difference between molar mass and number of molecules?
- ii. Suppose you have  $2.5 \times 10^{32}$  atoms of Bromine (Br), how many grams of  $\text{Br}_2$  do you have?
- iii. On a scale of 1-3 how confident are you in your ability to solve this problem?  
  
1 = not confident, 3 = confident
- iv. Is it possible to solve this problem using only one step (conversion factor)?

# *Agenda*

Finish Mole Bean lab

Continue to work of example practice problems for:

$g_A \leftrightarrow \text{mol}_A \leftrightarrow \text{molecules}_A$

*Objective:*

You will **KNOW** how the value of a mole was calculated and what a mole is!!!

EQ: After a win on a sports field or an academic assignment what is your next responsibility in order to repeat on the next challenge?

# ***Mole Bean Lab***

Follow all directions.

The formulas you need are on the bottom of  
the first page

Finish Part 2

# *Test Tomorrow, 1.Feb.2017*

Lewis Structure

Molecular geometry

Net Ionic Equations

# ***Bell Work***

## ***28-Jan-2016***

If you have 40g of glucose,  $\text{C}_6\text{H}_{12}\text{O}_6$ ,  
how many moles is that?



## *Objective:*

You will Practice using ratios in a chemical formulas during mole calculations.

EQ: After a win on a sports filed or an academic assignment what is your next responsibility in order to repeat on the next challenge?

# ***Bell Work***

## ***29-Jan-2016***

Suppose you have  $2.5 \times 10^{32}$  atoms of Bromine ( $\text{Br}_2$ ), how many grams of  $\text{Br}_2$  do you have?

1. On a scale of 1-3 how confident are you in your ability to solve this problem?

1 = not confident, 3 = confident

2. Is it possible to solve this problem using only one step (conversion factor)?

# *Molecules, Atom, Grams, and Mole Calculation Practice*

As a team Write out assigned problem and correct set up to solve on poster paper

Ex. How many grams would  $5.0 \times 10^{31}$  molecules of  $H_2O$  weigh?

$$\frac{5.00E^{31} \text{ molecules of } H_2O}{1} \times \frac{1 \text{ mol } H_2O}{6.022E^{23} \text{ molecules } H_2O} \times \frac{18.0 g H_2O}{1 \text{ mol } H_2O} = 1.4955E^9 g H_2O$$

Molecule  $\rightarrow$   
mole conversion

Mole  $\rightarrow$  Mass  
Conversion

# ***PRACTICE***

Convert 3.2 moles of sand ( $\text{SiO}_2$ ) to molecules of sand.

How many molecules of NaCl are there in 5 moles of NaCl?

If you have  $4.5 \times 10^{56}$  molecules of  $\text{CO}_2$  how many grams do you have?

# *And More*

**There are 5.4million bees on a bee ranch, how many moles of bees are there?**

**How many grams of KOH are there in  $1.673 \times 10^{23}$  molecules of KOH?**

**How many molecules of HgO are there in 1.25g of HgO?**

# *Bell Work*

## *3-Feb-2017*

A clam shell found on the beach was weighed out to 20.0 grams. How many moles of Oxygen (O) is the shell composed of?  
Grams of Oxygen (O)?



Hint: Clam shells are made of calcium carbonate

## *Objective:*

You will KNOW how to use ratios in a chemical formulas during mole calculations.

EQ: After a win on a sports field or an academic assignment what is your next responsibility in order to repeat on the next challenge?

# *Mole Of Chalk Lab*

No Pre lab 😊!

Draw any picture on the Black Paper. The pictures must be school appropriate!

Use the same scale before and after

**Do Not Use Up All of Your Chalk**



# *Mole Of Chalk Lab*

## **Post lab calculations**

# *Practice*

How many grams of  $\text{CaCO}_3$  are there in  $5.67 \times 10^{13}$  atoms of  $\text{CaCO}_3$ ?

How many atoms of  $\text{MgCrO}_3$  are there in 4.8g of  $\text{MgCrO}_3$ ?

# *PRACTICE*

$5.0 \times 10^{20}$  molecules of  $\text{Cl}_2 \rightarrow$  moles  $\text{Cl}_2 \rightarrow$  g  $\text{Cl}_2$

$3.5 \times 10^{21}$  molecules of  $\text{NaCl} \rightarrow$  moles  $\rightarrow$  g  $\text{NaCl}$

2.5 g  $\text{NaCl} \rightarrow$  moles  $\text{NaCl} \rightarrow$  molecules  $\text{NaCl}$

5 g  $\text{Cl}_2 \rightarrow$  moles  $\text{Cl}_2 \rightarrow$  molecules  $\text{Cl}_2$

# *PRACTICE*

**How many molecules of Oxygen are in 4 grams of  $O_2$ ?**

**How many grams of Hydrogen are in  $7.03 \times 10^{23}$  molecules of  $H_2$ ?**

**How many molecules of NaCl are in 9g of NaCl?**

**How many grams of KBr are in  $5.034 \times 10^{25}$  molecules of KBr?**

# *Objective*

You will be assessed on your knowledge of  
writing correct chemical formulas AND  
writing correct balance chemical equations

# *BELL WORK*

## *6-Feb-2017*



What is the mole ratio of methane ( $\text{CH}_4$ ) to water in the balanced equation?

If you combusted 454.0g of methane how many mole would that be?

How many moles of water would be created? (recall mole ratio)

# *Objective*

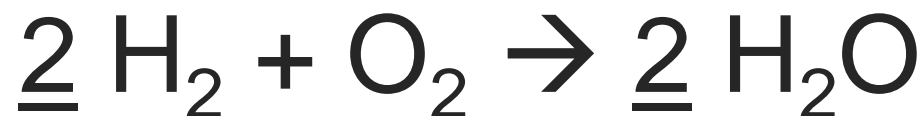
You will complete the mole of chalk lab and finish and remaining work form last week

You will begin to see the use of coefficients in a balance equations

**EQ: How does being confident in only part of a very large number impact results**

# *MOLAR RATIO*

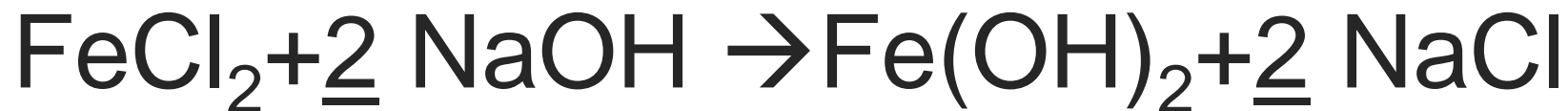
The ratio of moles of compounds in a chemical equations  $\rightarrow$  coefficients



So for every 2 moles of  $\text{H}_2$  there are 2 moles of  $\text{H}_2\text{O}$  and 1 mole of  $\text{O}_2$



# *MOLAR RATIO*



So for every 2 moles of NaOH there are 2 moles of NaCl and 1 mole of FeCl<sub>2</sub> and Fe(OH)<sub>2</sub>

# *GIVE THE MOLAR RATIOS*



**H<sub>2</sub>S to HF & F<sub>2</sub> to SF<sub>4</sub>**



**O<sub>2</sub> to H<sub>2</sub>SO<sub>4</sub> & SO<sub>2</sub> to H<sub>2</sub>O**



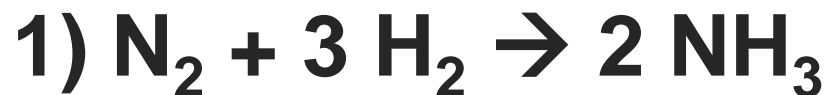
**NaSiO<sub>3</sub> to H<sub>2</sub>O & HF to NaF**

## *And Some More ☺*

**How many atoms of  $\text{C}_3\text{H}_8$  are present in 451 g  $\text{C}_3\text{H}_8$ ?**

**What is the mass of  $1.20 \times 10^{12}$  molecules of carbon dioxide?**

## *And Some More!!*



Write the molar ratios for  $\text{N}_2$  to  $\text{H}_2$  and  $\text{NH}_3$  to  $\text{H}_2$  in fraction form.



Write the molar ratios for  $\text{O}_2$  to  $\text{SO}_3$  and  $\text{O}_2$  to  $\text{SO}_2$  in fraction form.



Write the molar ratios for  $\text{PCl}_3$  to  $\text{Cl}_2$  and  $\text{PCl}_3$  to  $\text{PCl}_5$  in fraction form.